

REMARKS

INTRODUCTION

In accordance with the foregoing, claims 2, 13, 22, 23 and 26 have been amended. Claims 5-8, 15, 16 and 25 have been canceled. Claims 2, 10, 11, 13, 22, 23 and 26 are pending and under consideration.

CLAIM REJECTIONS – 112

Claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25 and 26 were rejected under 35 USC 112, second paragraph, as being indefinite. Appropriate correction has been made to the claims in accordance with the Examiner's comments.

Specifically, regarding claim 2, claim 2 has been amended to improve the form of the claim to clearly distinguish claim 2 as a method or process claim. Further, claim 2 has been amended to recite "verifying the virtual workshop by adjusting the information and settings stored in the computer so that the simulated productivity is optimized..." Support for this amendment may be found on at least page 6 of the present application. As amended, claim 2 now clearly recites that the virtual workshop is optimized using simulation, so verified, and then an actual workshop is constructed to be compatible with the verified virtual workshop.

Regarding claims 5-8, these claims have been cancelled.

Regarding claim 13, claim 13 has been amended to improve the form of the claim to clearly distinguish claim 13 as a system claim. Further, claim 13 has been amended to recite that "the virtual workshop is verified by adjusting the information and settings stored in the computer so that the simulated productivity is optimized..." Support for this amendment may be found on at least page 6 of the present application. As amended, claim 13 now clearly recites that the virtual workshop is verified by adjusting the information and settings in the simulating unit, and then the actual workshop is constructed according to the verified virtual workshop.

Regarding claims 15 and 16, these claims have been cancelled.

Regarding claim 22, claim 22 has been amended to improve the form of the claim to clearly distinguish claim 22 as a system claim. Further, claim 22 has been amended to recite that "the simulating means verifies the virtual workshop by altering the adjustment conditions and operating conditions so that the simulated production state and physical distribution state on

the layouts is optimized when a modular unit of the production facility is interchanged...”
Support for this amendment may be found on at least page 6 of the present application. As amended, claim 22 now clearly recites that the virtual workshop is verified by altering the adjustment and operating conditions optimize the virtual workshop, and then the actual workshop is constructed according to the verified virtual workshop.

Regarding claim 23, it is respectfully submitted that claim 23 is definite in its present form.

Regarding claim 25, this claim has been cancelled.

Regarding claim 26, claim 26 has been appropriately amended in accordance with the Examiner's suggestions.

Withdrawal of the foregoing rejections is requested.

CLAIM INTERPRETATION

Page 10 of the Office Action, item 14, contained the Examiner's interpretation of claims 5, 7 and 8. Claims 5, 7 and 8 have been cancelled. The cancellation of claims 5, 7 and 8 is not intended to indicate that the Applicants agreed or disagreed with the Examiner's interpretation of these claims or the terms recited therein.

CLAIM REJECTIONS – 103

Claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25, and 26 were rejected under 35 USC 103(a) as being unpatentable over “Process Subsystem Architecture for Virtual Manufacturing Validation” by J. Michael Griesmeyer and Fred J. Oppel, III (hereinafter “Griesmeyer”).

Claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25, and 26 were further rejected under 35 USC 103(a) as being unpatentable over “Virtual Reality and Simulation” by Martin Barnes (hereinafter “Barnes”) in view of “Simulation in the Next Millennium” by Sanjay Jain (hereinafter “Jain”).

Claims 2, 5-8, 10 and 11

Amended independent claim 2 recites: “...storing information concerning structures of various rolling bearing production facilities and physical distribution facilities, which are to be newly established in a portion of newly established or existing workshops, information concerning structures of existing portions of those workshops, which are to be kept in

existence, or information concerning structures of various rolling bearing production facilities and physical distribution facilities to be newly established in a newly established workshop designed newly in whole..." In contrast to claim 2, Griesmeyer only discusses a virtual validation of the assembly sequences for factory components through the use of assembly subsystem control architecture. See Griesmeyer, page 2375, section 4. Griesmeyer does not discuss the step of storing information of a variety of production facilities but is only concerned with providing an optimal arrangement of an existing workshop space.

Support for this amendment to claim 2 may be found on page 3, lines 6-13, of the present application. This section of the present application notes: "...in the production line for the production of a rolling bearing assembly, a grinding machine for grinding an outer race groove, a grinding machine for grinding an inner periphery of an inner race, a grinding machine for grinding an inner race groove and other are necessitated as production facilities, but these grinding machines are such that the entire facility is of a peculiar design and, therefore, rearrangement of the production line requires new introduction of the individual facilities in their entirety." Accordingly, even when a model number of the product is changed, the entire facility should be rearranged. In contrast, the rearrangement of a facility in the present invention, as recited in claim 2, is facilitated by simulating a virtual workshop.

Furthermore, when it comes to the rolling bearing assembly, not only the processing accuracy of each of the component parts forming such rolling bearing assembly, but also the tolerance, with which the rolling bearing assembly is assembled with those component parts is the matter of the utmost importance. As is well known to those skilled in the art, bearing tolerances are standardized by classifying bearings into some classes, therefore, not only the component parts but also the resultant rolling bearing assembly must by set up, manufactured and/or assembled so as to satisfy the specified tolerance. Designing a production with information on those tolerances taken into consideration is important in reducing the labor incurred in matching at the time of assemblage of the rolling bearing assembly. By way of example, if the rolling elements are each manufactured with a relatively large diameter, raceway members (outer and inner races) of respective lots that correspond to the lot of those rolling elements must be selected to satisfy a desired or required tolerance. Accordingly, if peculiarities (so called "habit") of processing machines and equipment are stored in a database, submicron-order measurements of components, which involves an immense amount of time and effort, can

be eliminated, and the matching can be facilitated during assemblage of the rolling bearing assembly.

Claim 2 was additionally rejected based on a combination of Barnes and Jain. In contrast to claim 2, Barnes only discusses that a manufacturing design plan may be validated by simulating the actual manufacturing processes and equipment used in-house, at suppliers, etc. See Barnes, page 105, section 9.1.1. Barnes does not discuss that the structures of production facilities are stored. As recited later in claim 2, the storage of various production facilities allows for a simulated workshop to be optimized. Barnes only compares the manufacturing processes at an existing factory to the proposed manufacturing processes at another existing factory.

Further, this deficiency in Barnes is not cured by Jain. Jain also is concerned with the arrangement of subsystems in a factory, not with the overall design of a new factory. Jain discusses a virtual factory having advanced decision support capability to rearrange components and business processes in the factory to ensure efficient operation of the factory. See Jain, page 1481-1482, section 3.1. Jain does not discuss storing the structures of various facilities, only the one factory to mimic the real life operations of the factory. Further, it is respectfully noted that section 3.1 of Jain, which was relied on by the Examiner, is a subsection of section 3 titled "Simulation Application in the Near Term Future." As such, it is respectfully submitted that as Jain is discussing concepts, rather than realized methods or apparatuses, this section of Jain should not be relied on for an obviousness rejection.

The technical feature of claim 2 of storing information concerning structures of various production facilities and physical distribution facilities of an existing or newly established workshop having a portion or the whole that is newly designed provides a virtual workshop that has been modeled based on data and can verify a production state making verification of the workshop in its entirety simple. By this advanced verification, it is possible to reduce the facility costs and the stock advantageously. Also, since the actual workshop is constructed based on the data model of the virtual workshop verified by the simulation and the actual workshop is then remote monitored to provide monitoring results which are subsequently compared with results of verification during the simulation, the results of the simulation can be effectively utilized in remote monitoring to facilitate a proper remote monitoring of the newly constructed workshop. This feature is not discussed in Griesmeyer, Barnes or Jain and it is therefore respectfully submitted that claim 2 patentably distinguishes over the relied upon references.

Claims 5-8 have been cancelled. Claims 10 and 11 depend on claim 2 and are therefore believed to be allowable for at least the foregoing reason.

Withdrawal of the foregoing rejection is requested.

Claims 13, 15 and 16

Amended independent claim 13 recites: "...a virtual workshop, which is to be newly constructed, stored in the computer, the virtual workshop being based on information concerning structures of various rolling bearing production facilities and physical distribution facilities which are to be newly established in a workshop, information concerning functions of the various facilities, information concerning control devices of the various facilities, information concerning configurations and information concerning adjustment conditions necessary to adjust the rolling bearing production facilities and the physical distribution facilities, and information concerning operating conditions of and layouts of the various facilities of the workshop..." It is respectfully submitted that neither Griesmeyer, Barnes nor Jain discuss the feature of claim 13 of a virtual workshop based on information concerning functions of the various facilities.

Claims 15 and 16 have been cancelled.

Withdrawal of the foregoing rejection is requested.

Claims 22, 23 and 25

Amended independent claim 22 recites: "...a virtual workshop authoring authoring unit that authors a virtual workshop by storing in the computer information concerning structures of various rolling bearing production facilities and physical distribution facilities of a workshop, information concerning functions of the various facilities, information concerning control devices of the facilities, information concerning configurations and information concerning adjustment conditions necessary to adjust the rolling bearing production facilities and the physical distribution facilities, and information concerning operating conditions and layouts of the various workshop facilities..." It is respectfully submitted that neither Griesmeyer, Barnes nor Jain discuss the feature of claim 22 of a virtual workshop authored based on information concerning structures of various facilities.

Claim 25 has been cancelled. Claim 23 depends on claim 22 and is therefore believed to be allowable for at least the foregoing reason.

Withdrawal of the foregoing rejection is requested.

Claim 26

Amended independent 26 recites: "...a virtual workshop authoring that authors a virtual workshop by storing in the computer information concerning structures of various rolling bearing production facilities and physical distribution facilities of a workshop, information concerning functions of the various facilities, information concerning control devices of the facilities, information concerning configurations and information concerning adjustment conditions necessary to adjust the rolling bearing production facilities and the physical distribution facilities, and information concerning operating conditions and layouts of the various workshop facilities..." It is respectfully submitted that neither Griesmeyer, Barnes nor Jain discuss the feature of claim 26 of a virtual workshop authored based on information concerning structures of various facilities.

Withdrawal of the foregoing rejection is requested.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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